CLAIMS

Claim 1 (currently amended): I claim a technology element that calculates Multi-Axes Tool Compensation ~~technology handles all tool compensation~~ internal to a central mathematical set of algorithms in memory of the CNC controller which ties all of the provided set of commands together as described in the steps and elements of which comprise:

a. The user setting his or her preferences for the values or amounts to compensate into boxes on an operator screen, such as the example screen in FIG 1. for the boxes labeled tool size, horizontal offset, vertical offset, tool wear, corner radius, bottom angle, side angle and tool length. These interact with the G code program and other values optionally inputted or gathered as variables when the math calculations are performed.

b. The user must repeat the steps in Claim 1.a setting and entering his or her preferences for each tool description. There is no limit to the number of tools, machine types or tool shape combinations to enter.

c. An industry standard G Code program, as in FIG 9., containing tool positions based on non-compensated original part geometry data, interact with the Multi-Axes tool compensation calculations when they are applied. These are the original tool positions that the user supplies in which the calculations are applied. These interact with values provided on the tool parameter screen. For each multi-axes X,Y,Z,A,B,C value entered in the G Code program, the controller will calculate a compensated value based on the amounts entered into the tool parameter screen as in the example screen in FIG 1.

d. A set of optional text entered commands are provided to interact and be directly entered onto the operator screen to override or toggle features on/off and adjust values:

TOOLCOMP OFF	'Turns all compensation off.
TOOLCOMP LEFT	'Comps tool in 2D to the left.
TOOLCOMP RIGHT	'Comps tool in 2D to the right.
TOOLCOMP 3DCOMP	'3D comp based on vector and gouge parameter.
TOOLCOMP 3DADJUSTZ	'3D comp lifts Z axis only but keeps X,Y.
TOOLCOMP 3DOFFSET	'3D parallel offset only - based on vector and 'no gouge parameter.
TOOLCOMP 5AXIS	'5-axis comp based on vector and gouge parameter.
TOOLCOMP LLIMIT45	'Give angle which will specify a gouge to omit tool.

e. A multi-axes tool positioner in a tool holder mounted to a machine's spindle cuts the part as shown in FIG 7 and FIG 8.

f. The process of gathering the user-entered information, preferences, values, amounts, on/off options on the operator screen as in FIG 1, or as entered by optional text commands as in Claim 1.d interact with the original tool positions as provided in the G code program, as in FIG 9, to provide the mathematical variables when processed by a set of described central mathematical routines internal to the CNC Controller as outlined in the DETAILED DESCRIPTION OF THE INVENTION section. The various methods for gathering the information are incidental as to how the central set of math routines that perform these calculations receive them.

Claim 2 (currently amended): I claim a Multi-Axes Tool Compensation element according to Claim 9, which automatically calculates ~~does~~ tool gouge avoidance protection internal to the CNC controller's central set of math routine algorithms as shown in FIG 5 Dim "E" Item 7.

Claim 3 (currently amended): I claim a method pertaining to Claim 1 for Multi-Axes Tool Compensation, which automatically contains algorithms to lift the tool to safe positions or skip the move when necessary by determining if the LLIMIT parameter, as shown in FIG 5 Dim "E" Item 7, is in violation of any surrounding obstacles as determined by a user-defined variable value as enter on the operator screen in FIG 1.

a. This claim is an alternative claim method of calculating tool gouge avoidance and tool protection as outlined in Claim 2.

Claim 4 (currently amended): I claim a method pertaining to Claim 1 which ~~Multi-Axes Tool Compensation~~ does not depend on the CNC programmer to re-define tool position coordinates when the tool characteristics change.

Claim 5 (currently amended): I claim a method pertaining to Claim 1 which ~~Multi-Axes Tool Compensation~~ allows the ~~CNC~~ machine operator[[s]] to override the pre-defined tool characteristics by entering or setting defined values as described by and shown in FIG 1 on the operator screen

Claim 6 (canceled)

Claim 7 (original): I, Gary John Corey, solely invented Multi-Axes Tool Compensation technology based on research I conducted as a CNC machinist.

Claim 8 (canceled)

Claim 9 (new): I claim an algorithm element according to Claim 1 which does not store or pass the compensated positions by geometry alone but rather expands the intelligence of each calculation for compensated tool positions based on an artificial intelligence algorithm element.

a. The artificial intelligence algorithm element is actually a live, real-time, ever-changing database in the machine's memory that remembers by learning from what the machine can and cannot do. The database is a storage of events, variables as an internal list of conditions and positions kept in standard random access memory as outlined by the various variables used by the central set of math algorithms.